

# PATENT SPECIFICATION

775.387



Date of Application and filing Complete Specification Dec. 3, 1954

No. 35000/54.

Application made in Japan on June 4, 1954.

Application made in Japan on June 9, 1954.

Complete Specification Published May 22, 1957.

Index at acceptance : —Classes 15(2), GA2, GB(2B1: 2B2: 2BX: 4B: 4C: 4D: 5C), GC1 (A1: A2: H2A: H2X), GC2C4; and 120(3), F(22: X), G7B.

International Classification : —D01b, D02d, D06m.

## COMPLETE SPECIFICATION

### Process for Manufacturing Spun Yarn

We, KANEGAFUCHI BOSEKI KABUSHIKI-KAISHA, a Japanese Joint Stock Company, of No. 612, 2-Chome, Sumida-Machi, Sumida-Ku, Tokyo-To, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to a novel method of manufacturing mixed spun yarn. It is an aim of the invention to make it possible to produce a yarn of almost any desired fineness, regardless of the fineness of the fibres employed.

15 It has been proposed to produce mixed yarns containing both soluble and insoluble fibres, but according to this prior proposal the fibres are each spun separately and then the two yarns thus formed are spun together to form the final product.

20 According to the invention, a yarn is produced by mixing short staple fibres of polyvinyl alcohol, which are soluble in a solvent such as hot or cold water or aqueous solutions, with basic short fibres such as cotton, wool, silk, animal hair, hemp, or artificial fibres or mixtures of these, not soluble in the said solvent and then spinning the resulting mixture of soluble and insoluble fibres into a yarn, after which the yarn is scoured with the said solvent so that the polyvinyl alcohol fibres are removed and only the insoluble fibres remain.

25 The fibres may or may not be made up into slivers before mixing. The polyvinyl alcohol fibres may not be pure, and they may include other fibres soluble in the same solvent, for example slightly acetalized or esterified vinyl alcohol fibres. The slight acetalisation or esterification does not affect the solubility appreciably. There may also be present fibres which have been treated with a thermally reversible gelling agent such as boric acid, borates, or congo red.

30 45 Where the polyvinyl alcohol fibres are such that they do not dissolve in cold water, the solvent may be hot water at a temperature

above 30° C., or it may be a solution of an organic or inorganic acid, such as hydrochloric, sulphuric or acetic acid, or a concentrated solution of a neutral salt such as calcium nitrate or magnesium or calcium chloride.

It will be appreciated that, since the polyvinyl alcohol fibres are produced artificially, their fineness and length may be selected as desired. Thus by the method of the invention, it is possible to produce a yarn embodying a basic fibre of a fineness which could not be spun alone, by mixing the fine basic fibre with suitably fine soluble polyvinyl alcohol fibres, spinning the mixture, then dissolving out the polyvinyl alcohol fibres. Then the count of the final product is finer than otherwise possible, in dependence on the proportion of polyvinyl alcohol fibres used.

60 The resulting yarn may be employed as it is, or after intertwisting and may be woven or knitted into fabric like the ordinary spun yarns, before the polyvinyl alcohol fibres are dissolved out. Then the manufactured fabric is scoured with water or another aqueous solvent, such as an aqueous soap solution, to dissolve out the polyvinyl alcohol fibres and convert the fabric into one of finer count and including gaps.

65 A number of examples of methods according to the invention will now be described:—

#### EXAMPLE I.

Basic fibres of cotton or artificial material are used, together with polyvinyl alcohol fibres of 1.5 denier and of length as nearly as possible equal to that of the basic fibres.

(a) The basic and polyvinyl alcohol fibres are fed in predetermined relative proportions into a mixing machine and thoroughly mixed together. The mixture of fibres is then spun into a yarn on a spinning frame.

(b) In an alternative procedure starting with the same ingredients, the polyvinyl alcohol fibres are formed into slivers, and the basic fibres are also formed into slivers, the two sets of slivers then being fed simultaneously into a drawing frame or sliver-lap

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machine in pre-arranged relative proportions and are thus drafted. The mixed drafted fibres are then spun into a yarn.

- (c) In a third procedure slivers are formed separately of the polyvinyl alcohol fibres and of the basic fibres, and then the two kinds of slivers are fed simultaneously in pre-arranged relative proportions into a common flyer frame which drafts them. They are then spun into a yarn in a spinning frame. Alternatively the two kinds of slivers may be fed directly to a spinning frame and spun into a yarn.

#### EXAMPLE II.

- This example is concerned with a yarn made from a mixture of polyvinyl alcohol fibres with fibres of wool. The polyvinyl alcohol fibres are about 1.5 denier and are cut to a length as nearly as possible equal to that of the wool fibres.

- To produce a mixed spun yarn, a worsted spinning machine is employed, making use of one of the following processes:—

- (a) The two kinds of fibres (polyvinyl alcohol and wool) are fed simultaneously in pre-arranged relative proportions into a feeding hopper and the resulting mixture is then spun into a yarn in a mule spinning frame or ring spinning frame. The usual back washing process is omitted.

- (b) Slivers formed from the polyvinyl alcohol fibres and slivers formed from the wool fibres are fed simultaneously in pre-arranged relative proportions into an intersecting gill box to form mixed and drafted slivers which are then spun into a yarn on a spinning frame. Alternatively the two kinds of slivers may be directly mixed together mechanically and then spun into a yarn on a spinning frame.

#### EXAMPLE III.

- This example is concerned with a mixture of polyvinyl alcohol fibres with fibres of flax. The polyvinyl alcohol fibres are of about 1.5 denier gauge and are cut to a length as nearly as possible equal to that of the flax fibres.

- Slivers of the polyvinyl alcohol fibres and slivers of the flax fibres are fed simultaneously in pre-arranged relative proportions into a first drawing frame to form mixed and drafted fibres which are subsequently spun into yarn on a dry spinning frame.

- In each of the three examples, the mixed yarn formed is subsequently scoured with a solvent which dissolves the polyvinyl alcohol fibres and leaves the others, so that the remaining yarn is then of finer count than the mixed yarn. The solvent may be cold water, or hot water about 80° C., or aqueous solutions as specified earlier.

The scouring may take place on the yarn or on the woven or knitted fabric into which it is made.

Figures 1 and 2 of the accompanying drawings illustrate examples of mixed yarns produced by the process according to any of the above examples and before the polyvinyl alcohol fibres are dissolved out. Figure 1 shows a yarn 3 comprising short fibres 1 of polyvinyl alcohol together with fibres 2 of the basic non-soluble fibres such as cotton, wool, animal hair, silk, hemp, or artificial non-soluble fibres. In Figure 2 is shown a yarn 3' including the polyvinyl alcohol fibres 1, soluble in water or in an aqueous solution as defined earlier, together with two different kinds of non-soluble fibres, 2 and 2'.

What we claim is:—

1. A process for producing a yarn comprising the steps of mixing short staple fibres of polyvinyl alcohol, which are soluble in a solvent such as hot or cold water or aqueous solutions, with basic short fibres, such as cotton, wool, silk, animal hair, hemp, or artificial fibres or mixtures of these, not soluble in the said solvent, and then spinning the resultant mixture of soluble and insoluble fibres into a yarn, after which the yarn is scoured with the said solvent so that the polyvinyl alcohol fibres are removed and only the insoluble fibres remain.

2. A process according to Claim 1, in which the fibres are made up into slivers separately before mixing.

3. A process according to Claim 1 or Claim 2, in which the mixed spun yarn is made up into a knitted or woven fabric before scouring with the solvent.

4. A process according to any of Claims 1 to 3, in which the solvent used is cold water.

5. A process according to any of Claims 1 to 3, in which the solvent used is hot water above 80° C.

6. A process according to any of Claims 1 to 3, in which the solvent is an aqueous soap solution.

7. A yarn or fabric produced by the process according to any of the preceding claims.

8. A process according to Claim 1, substantially as described in any of the Examples I to III.

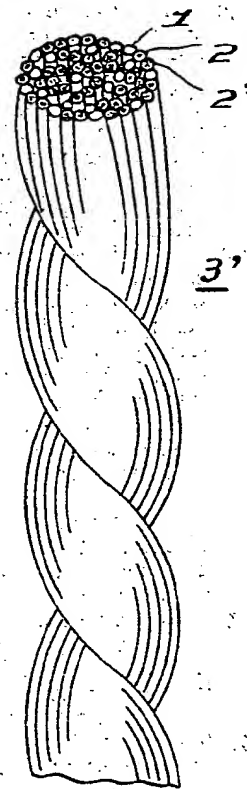
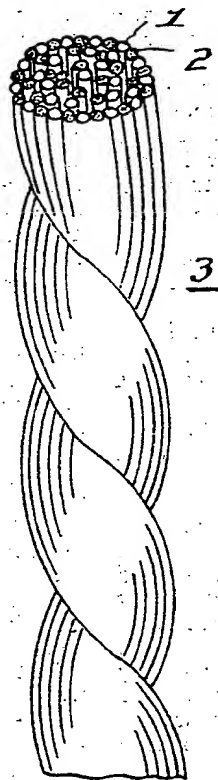
9. A yarn produced by the process according to Claim 8, substantially as described with reference to Figure 1 or 2 of the accompanying drawings.

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Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press,—1957.  
Published at the Patent Office, 25, Southampton Buildings, London, W.C.2, from which  
copies may be obtained.

*Fig. 1.*

*Fig. 2.*



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